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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/512,091	10/21/2004	Toshiyuki Fujimoto	0234-0478PUS1	8585
2292 7590 01/11/2007 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			EXAMINER CHANDRA, SATISH	
			ART UNIT	PAPER NUMBER
			1763	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	01/11/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 01/11/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/512,091

Applicant(s)

FUJIMOTO ET AL.

Examiner

Satish Chandra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>10/04, 1/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 –11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "multi-nuclear metal molecule" in claims 1 –11 is not clearly defined. For the purpose of examination, examiner is taking the meaning as 'a cluster of metal molecules'.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1- 3 and 5 – 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamashita (US 2002/0029746).

Yamashita discloses an apparatus (ion source) 2 (Fig 1) wherein the solid material, indium fluoride 6a is vaporized and the vapor 8 introduced in the plasma production vessel 16 for producing a plasma 24, is ionized (Para's 0028, 0039)

generating an ion beam 30. A filament 20 for thermionic emission is provided on one side within the plasma production vessel 16 for generating highly excited electrons (Para 0030) and an arc voltage for arc discharge is applied from an arc power source 34 between the filament 20 (Para 0031) and plasma production vessel serving as anode.

Claims 1- 3 and 5 – 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Horsky et al (US 7,107,929).

Horsky discloses:

A vaporizer 2 (Fig 3, Column 22, lines 55 – 65) and an ion source (Fig 3) wherein the gases are ionized by interaction with the electron beam of highly-excited electrons transported from the electron gun 12 (Column 23, lines 16-18).

Claims 1- 3 and 5 – 8 are rejected under 35 U.S.C. 102(e) as being anticipated by Watababe et al (US 2002/0132063).

Watababe et al discloses an electron gun 8 (Para 0029, Fig 2) to irradiate an electron beam toward a respective crucible 7 into which a film material 9 is supplied and is heated by the irradiation of the electron beam by the electron gun 8.

The film forming apparatus 20 (Fig 1) in which film materials evaporated by the respective main heating processes are further ionized by an electric field formed within the vacuum chamber 1 (Para 0055).

It is inherent to have plasma and electric field where electron guns are used.

Claims 1, 2, 4, 8 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Cadieu (US 6,805,916).

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Cadieu discloses a magnetic field pulsed laser deposition (PLD) system (Fig 1) wherein when the laser 20 is activated, pulsed energy is directed to a region of the target 30 to form the plume 31 of vaporized target material containing ions (Column 1, lines 58-60).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita (US 2002/0029746) in view of Mizutani et al (US 5,284,544).

Yamashita was discussed above.

Yamashita does not disclose the use of light irradiation for ionizing molecules that are vaporized or atomized.

Mizutani et al discloses (Column 5, lines 40 – 50) to form radicals (ions) by excitation or dissociation by photo-absorption of gas molecules.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form radicals (ions) by excitation or dissociation by photo-absorption of gas molecules as taught by Mizutani et al.

The motivation to form ions by excitation or dissociation by photo-absorption of gas molecules is to provide an alternate and equivalent means of ionizing gas or vapor

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or supply less energetic ions to prevent damage to the substrate as taught by Mizutani et al.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita (US 2002/0029746), Mizutani et al (US 5,284,544), as discussed above in claims 1 – 7 and further in view of Vaartstra et al (US 6,402, 126).

Yamashita, and Mizutani et al do not disclose dissolving metal molecule in a solvent and then ionizing it.

Vaartstra et al discloses dissolving solute (metal molecules) in one or more compatible solvents and vaporizing the liquid precursor.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a solid precursor material dissolved in a solvent as a precursor source in the apparatuses of Yamashita and Mizutani et al as taught by Vaarstra et al.

The motivation to dissolve a metal molecule in solvent is to vaporize metal molecules with very little or no vapor pressure as taught by Vaarstra et al.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morimoto et al (US 4,559,901) and Dykstra (US 2002/0162508).

Morimoto et al discloses an apparatus (Fig 9, (Column 8, lines 1 –15) wherein the heating of the crucible 15 is carried out using electrons emitted from a filament 17. The vaporized multi nuclear metal material ejected from the nozzle 14 is ionized from an ionization electron emitting filament 19. To accelerate the ionized cluster, an electric

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field produced by the accelerating electrode 23 enters or penetrates into the ionization region 22 to form a convergent lens system (Column 3, lines 7 – 13).

Morimoto et al does not disclose scanning means.

Dykstra discloses a scanning mechanism 116 (Fig 1) for scanning the accelerated ion clusters to uniformly process the surface of the target 118 or work-piece (Para 0007).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide scanning means for scanning the ion clusters in the apparatus of Morimoto et al as taught by Dykstra.

The motivation of providing scanning means is scan the ion clusters to uniformly process the target surface as taught by Dykstra.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Satish Chandra whose telephone number is 571-272-3769. The examiner can normally be reached on 8 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, Primary Examiner, Jeffrie R. Lund can be reached on 571-272-1437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Satish Chandra


Jeffrie R. Lund

Primary Examiner

SC
1/5/2007

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